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| 10/759,299      | 01/20/2004  | Takuo Sone           | Q79484              | 7184             |

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EXAMINER

EGWIM, KELECHI CHIDI

ART UNIT PAPER NUMBER

1713

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/759,299  
Filing Date: January 20, 2004  
Appellant(s): SONE ET AL.

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Jennifer Leach  
For Appellant

**EXAMINER'S ANSWER**

**MAILED**  
MAY 15 2006  
**GROUP 1700**

This is in response to the appeal brief filed 03/15/2006 appealing from the Office action mailed 07/15/2005.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

Appeal No. 2002-1066

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

No amendment after final has been filed.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is deficient. 37 CFR 41.37(c)(1)(v) requires the summary of claimed subject matter to include: (1) a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, referring to the specification by page and line number, and to the drawing, if any, by reference characters and (2) for each independent claim involved in the appeal and for each dependent claim argued separately, every means plus function and step plus function as permitted by 35 U.S.C. 112, sixth paragraph, must be identified and the structure, material, or acts described in the specification as corresponding to each claimed function must be set forth with reference to the specification by page and line number, and to the drawing, if any, by reference characters.

The brief is deficient because it is not a concise explanation of the subject matter defined in the independent claims, but in fact a broad explanation of the subject matter described in the specification, which is much broader than what is actually claimed in

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the independent claims. The compounds named in appellant's summary are not claimed in the present independent claims.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

|             |                  |        |
|-------------|------------------|--------|
| JP 05059103 | IKEMATSU ET AL.  | 3-1993 |
| JP 05051406 | IKEMATSU ET AL.  | 3-1993 |
| JP 08073515 | TSUJIMOTO ET AL. | 3-1996 |

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-15 and 18-20, claiming both the product and the process for producing the product in this invention, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikematsu et al. (JP '103) in combination with Tsujimoto et al.

In the abstract and ¶ 44 (see translation), Ikematsu et al. (JP '103) teach methods for producing conjugated diene polymers comprising

polymerizing a conjugated diene in an inert organic solvent in the presence of a catalyst system comprising a) a rare earth metal element/compound, including lanthanum series atomic numbers 57-71 (see ¶ 19), b) an organo-aluminum compound (see ¶ 37 Formula 10 of Ikematsu et al.

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(JP '103):  $\text{AlR}^{14}_3\text{-I}$ , i.e.,  $\text{AlR}^{14}_3\text{R}^{14}_3$  wherein I is 0) corresponding to (Formula 1 in claim 1), and c) a halide compound, and

reacting the resulting polymer with a coupling agent selected from a carboxylic acid, acid halide and acid anhydride (consistent with the present compound i), in order to increase branching in the polymer and compatibility with other polymer material such as rubbers, various fillers, and polymer modifiers such as rubber-reinforced impact resistant polystyrene. (see ¶ 6 & 7) .

Ikematsu et al. (JP '103) further teach the resulting conjugated diene polymers to have narrow molecular weight distributions and high cis-1,4-bond contents.

Ikematsu et al. (JP '103) differ from the claimed invention in that, the catalyst is not disclosed as further comprising an aluminoxane component. However, it is well known in the art to add an aluminoxane to a catalyst system for polymerizing conjugated dienes, already comprising a) a lanthanum series rare earth metal compound, b) an organoaluminum and c) a halide compound, for the purpose of obtaining improved activities in the catalyst system, **resulting in narrower molecular weight distributions**, such as taught by Tsujimoto et al. (See ¶ 25 in full translation of Tsujimoto et al.)

In ¶ 6-7, Tsujimoto et al. teach a conjugated diene polymerized in the presence of a catalyst system, said catalyst system comprising a) rare earth metal compounds (lanthanum series atomic numbers 57-64 exemplified), b) an organoaluminum compound represented by  $\text{AlR}^1\text{R}^2\text{R}^3$ , c) a halide compound and d) an aluminoxane. See ¶ 15-18 in Tsujimoto et al.

In ¶ 23, Tsujimoto et al. teach the rare earth metal compound to be used in an amount of 0.0001-1.0 mmol per 100g of the conjugated diene compound. Tsujimoto et al. also teaches the catalyst to have such a composition ratio that the molar ratio of the metal compound to the halide compound is 1:0.1-1:15, the molar ratio of the metal compound to the aluminoxane is 1:10-1:5000, the molar ratio of the metal compound to the organoaluminum compound is 1:1-1:5000, and the molar ratio of the aluminoxane to the organoaluminum compound is 1:0.01-1:100. In tables 1, 2 and 6, Tsujimoto et al. show the resulting polymer after polymerization with the catalyst to have Mw/Mn ratios of 3.5 or less.

Tsujimoto et al. also teaches that the polymer may be treated with conventional additives after polymerization. (see ¶ 32)

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made, to include aluminoxanes in the catalyst system of Ikematsu et al. (JP '103), in order to obtain the advantages of improved activities in the catalyst system and **narrower molecular weight distributions in the polymer**, such as taught by Tsujimoto et al., motivated by a reasonable expectation of success.

Claims 1-15 and 18-20, claiming both the product and the process for producing the product in this invention, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikematsu et al. (JP '406) in combination with Tsujimoto et al.,

In the claims (See translation), Ikematsu et al. (JP '406) teach methods for producing conjugated diene polymers comprising polymerizing, in an inert

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organic solvent, a conjugated diene in the presence of a catalyst system comprise of a) a rare earth metal element/compound including lanthanum series atomic number 57-71(see ¶ 16), b) an organo-aluminum compound (see ¶ 29 Formula 12 of Ikematsu et al. (JP '406):  $\text{AlR}^{13}_{3-\text{I}}\text{H}_\text{I}$ , i.e.,  $\text{AlR}^{14}\text{R}^{14}\text{R}^{14}$  wherein I is 0) corresponding to (Formula 1 in claim 1), and c) a halide compound, and

reacting the resulting polymer with a coupling agent selected from an ester compound and a carboxylic ester compound (also consistent with the present compound i), in order to increase branching in the polymer and compatibility with other polymer material such as rubbers, various fillers, and polymer modifiers such as rubber-reinforced impact resistant polystyrene. (See ¶ 6 & 7) .

Ikematsu et al. (JP '406) further teach the resulting conjugated diene polymers to have narrow molecular weight distributions and high cis-1,4-bond contents (see ¶ 60).

Ikematsu et al. (JP '406) differ from the claimed invention in that, the catalyst is not disclosed as further comprising an aluminoxane component. However, it is well known in the art to add an aluminoxane to a catalyst system for polymerizing conjugated dienes, already comprising a) a lanthanum series rare earth metal compound, b) an organoaluminum and c) a halide compound, for the purpose of obtaining improved activities in the catalyst system, **resulting in narrower molecular weight distributions**, such as taught by Tsujimoto et al., above.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made, to include aluminoxane in the catalyst system of Ikematsu et al. (JP '406), in order to obtain the advantages of improved activities in the

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catalyst system and **narrower molecular weight distributions in the polymer**, such as taught by Tsujimoto et al., motivated by a reasonable expectation of success.

#### **(10) Response to Argument**

Regarding the argument that there is no motivation for combining the references the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the primary references, Ikematsu ('103 and 406), each individually teach methods for producing conjugated diene polymers comprising polymerizing conjugated dienes in an inert organic solvent in the presence of catalyst systems comprising a) lanthanum element/compounds, b) an organo-aluminum and c) halide compounds, and subsequently reacting the resulting polymer with the coupling agent, wherein the goal is conjugated diene polymers having narrow molecular weight distributions and high cis-1,4-bond contents.

The secondary reference teaches a similar method for producing conjugated diene polymers with a catalyst system, wherein **the secondary reference teach the additional inclusion of aluminoxane in the catalyst system, in order to obtain the advantages of improved activities in the catalyst system and narrower molecular weight distributions in the polymer**. That is the motivation taught in the prior art for combining the references. The fact that appellant may have recognized additional



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advantage which would flow naturally from following the suggestion of the prior art still cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Regarding that argument that "Tsujiimoto '515 does not disclose or suggest a method of producing a conjugated diene polymer in which a conjugated diene compound is polymerized with a catalyst consisting essentially of (a) to (d) in an organic solvent, and then reacting it with at least one compound selected from the group consisting of components (i) and (j)", again it appears that appellant is attempting to show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The motivation for the missing coupling agent component (i), is clearly taught in both primary references, each of which teach reacting the resulting polymer with one of appellants compounds (i) in order to increase branching in the polymer and compatibility with other polymer material such as rubbers, various fillers, and polymer modifiers such as rubber-reinforced impact resistant polystyrene. [see ¶ 6 & 7 of Ikematsu ('103) and ¶ 6 & 7 of Ikematsu ('406)] Appellant has not shown unexpected results by include what is already taught in the prior art, essentially for the same compatibility advantages.

Again, regarding appellant's declaration, appellant has only demonstrated possible additional advantages which would flow naturally from following the suggestion of the prior art (Tsujiimoto et al.) to include the aluminoxane catalyst component (c) in the catalyst mixture of components a, b and d, in order to reduce the molecular weight

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distribution of the diene polymer while increasing the molecular weight (see Tables 1, 3 and 6 of Tsujimoto et al.) and the suggestion in the prior art (Ikematsu et al.) to after treat the resulting diene polymer resulting from such catalytic polymerizations with the carboxylic acid compound in order to have lower solution viscosities [see the abstracts of Ikematsu et al. (JP '103 or JP '406)] and improved compatibility with modifiers and fillers. Regardless of any possible additional advantage appellant may have discovered from the process suggested by the prior art, it cannot be the basis for patentability when the combination of the references would have already been otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Regarding the comparison of the Runs in the declaration, appellant is essentially arguing that by combining the teachings of the prior art, thereby producing an example such as Run -1 or example 11 in appellant specification, that the properties of the product is improved over the composition of one of the primary references (Ikematsu '406 - represented by Run 5) or the secondary reference (runs 2 and 3), individually. However, this is precisely what is suggested by the prior art. Any additional advantages are a result of following the direction of the prior art to combine the references. For instance, the fact that the molecular weight distributions in Run 2 deteriorates in Run 1 when the coupling agent is added is not unexpected as the purpose of the coupling agent is not to narrow molecular weight distribution, but to improve compatibility with additives, which is in fact the result of Run 1. It is noted that the runs that include the aluminoxane catalyst component (Runs 1-3) all have better molecular weight distribution than the runs (4 & 5) which do not include the component, exactly as taught

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by Tsujimoto et al., above. The examiner finds no unexpected or “greater than expected” results from appellant’s declaration.

Appellant submits that “even if the coupling reaction of Ikematsu ‘103 (modification with a carboxylic acid or acid anhydride after the polymerization with a lanthanide catalyst) was used in [the Runs in] place of the coupling reaction disclosed in Ikematsu ‘406 (modification with an ester compound after the polymerization with a lanthanide catalyst), the results of combining Ikematsu ‘103 and Tsujimoto ‘515 would be the same as the result produced when combining Ikematsu ‘406 and Tsujimoto ‘515”. However, no evidence is submitted to support such an assertion. The ionic acid/aldehydes of Ikematsu ‘103 are distinct from the nonionic esters compounds of Ikematsu ‘406.

Appellant argues that “the examiner has not provided any reasonable basis to question Appellants’ comparative data and showing that the superior results are unexpected”. However, appellant’s runs are not one to one comparisons. Runs 1 to 3 have 0.18 mmols of  $\text{Nd}(\text{Oct})_3$ , yet Runs 4 and 5 have 0.21 mmols, and the same goes for the  $\text{Al}(\text{iBu})_3\text{H}$  and the  $\text{AlEt}_2\text{Cl}$ . Between Runs 1-3, the amount of aluminoxane varies from 18.5 mmol to 4.7 mmol.

Further, appellant’s declaration involves a specific rear earth elements in each of the examples, along with only a single aluminoxane, a single organoaluminum compound and a single halogen compound. The claims are much broader and cover a much broader scope of combinations of compounds than that represented in the declaration. There is no single example representative of the coupling agents taught to

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be used in Ikematsu '103. The declaration is not commensurate in scope with the claims.

**(11) Related Proceeding(s) Appendix**

Copies of the court or Board decision(s) identified in the Related Appeals and Interferences section of this examiner's answer are provided with appellant's brief.

For the above reasons, it is believed that the rejections should be sustained.

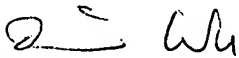
Respectfully submitted,

KCE

KELECHI C. EGWIM PH.D.  
PRIMARY EXAMINER



Conferees:



David Wu



James Seidleck



P.P.

Q49514

opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 30

UNITED STATES PATENT AND TRADEMARK OFFICE

**DOCKETED**

NOV 19 2003

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

**MAILED**

NOV 18 2003

Ex parte TAKUO SONE, KATSUTOSHI NONAKA,  
IWAKAZU HATTORI and AKIO TAKASHIMA

PAT. & T.M. OFFICE  
BOARD OF PATENT APPEALS  
AND INTERFERENCES

Appeal No. 2002-0166  
Application No. 09/033,685

HEARD: February 4, 2003

Before KIMLIN, PAK, and MOORE, Administrative Patent Judges.

PAK, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the examiner's refusal to allow claims 1 through 5, 8 through 14 and 19. Claims 6, 7 and 15 through 18, the remaining claims in the instant application, stand withdrawn from consideration by the examiner as being directed to a non-elected invention.

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APPEALED SUBJECT MATTER

According to the examiner (the first Office action dated October 4, 1999 (Paper No. 4, page 4), appellants were

required under 35 U.S.C. [§] 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable.

Pursuant to such a requirement, the appellants elected and prosecuted one of the species recited in claims 1 through 5, 8 through 14 and 19 on appeal. See, e.g., the Reply Brief dated May 17, 2001 (Paper No. 21), pages 4 and 5. Therefore, for purposes of this appeal, we limit our discussion and decision to the elected and prosecuted species recited in the claims on appeal only.<sup>1</sup> See *Ex parte Ohsaka*, 2 USPQ2d 1461, 1461-62 (Bd. Pat. App. & Int. 1987). Both the examiner and the appellants defined the elected and prosecuted species recited in the appealed claims as follows<sup>2</sup>:

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<sup>1</sup> We take no position on the non-elected species covered by the claims on appeal as they have not been examined or rejected by the examiner.

<sup>2</sup> See the Supplemental Examiner's Answer dated March 12, 2003 (Paper No. 26), page 3, and Appellants' Response to the Supplemental Examiner's Answer and to the Remand and Order under 37 CFR 1.196(a) and (d) dated April 11, 2003 (Paper No. 27) (hereinafter referred to as "Supplemental Reply Brief"), page 2.

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A method of producing a conjugated diene polymer which comprises polymerizing a conjugated diene compound with a catalyst consisting essentially of the following components (a) to (d) in an organic hydrocarbon solvent; and then reacting with at least one compound selected from the group consisting of the following component (g):

Component (a): a compound containing a neodymium compound or a compound obtained by reacting the neodymium compound with a Lewis base;

Component (b): a halogenated silicon compound;

Component (c): methylaluminoxane;

Component (d): an organoaluminum compound represented by the following general formula (1):



(wherein  $\text{R}^1$  and  $\text{R}^2$  are the same or different and are a hydrocarbon group having a carbon number of 1-10 or a hydrogen atom, and  $\text{R}^3$  is a hydrocarbon group having a carbon number of 1-10 provided that  $\text{R}^3$  is the same as or different from  $\text{R}^1$  or  $\text{R}^2$ );

Component (g): a hereto three-membered-ring containing compound having a chemical structure of the following general (7):

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..... (7)

(wherein Y' is an oxygen atom).

#### PRIOR ART

As evidence of obviousness, the examiner relies on the following prior art references:

|  |              |                            |
|--|--------------|----------------------------|
| Hattori et al (Hattori)                      | 0 267 675 A2 | May 18, 1988               |
| (Published European Patent Application)      |              |                            |
| Ansell et al. (Ansell)                       | WO 93/05083  | Mar. 18, 1993              |
| (Published International Patent Application) |              |                            |
| Tsujimoto et al. (Tsujimoto)                 | 08-073515    | Mar. 19, 1996 <sup>3</sup> |
| (Published Japanese Patent Application)      |              |                            |

#### REJECTIONS

The appealed claims stand rejected as follows:

- (1) Claims 1 through 4, 9 through 14 and 19 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Hattori and Tsujimoto; and
- (2) Claims 1 through 5, 8 through 14 and 19 under 35 U.S.C.

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<sup>3</sup> Our reference to Tsujimoto is to its corresponding English translation of record.



§ 103 as unpatentable over the combined disclosures of Hattori, Tsujimoto and Ansell.

OPINION

We have carefully reviewed the claims, specification and applied prior art references, including all of the arguments and evidence advanced by both the examiner and the appellants in support of their respective positions. This review leads us to conclude that only the examiner's Section 103 rejection of claims 1 through 5, 8 through 14 and 19 as unpatentable over the combined disclosures of Hattori, Tsujimoto and Ansell is well founded. Accordingly, we affirm only this Section 103 rejection for essentially those reasons set forth in the Answer and below.

The examiner finds (Answer, pages 3 and 4), and the appellants do not dispute (Brief, Reply Brief and Supplemental Reply Brief in their entirety), that Hattori teaches a process for producing a modified conjugated diene polymer, comprising polymerizing a conjugated diene in an inert solvent in the presence of a catalyst and then reacting (modifying) the resulting conjugated diene polymer with an epoxide (three-membered heterocyclic ring) containing compound. See also, e.g., Hattori, abstract and page 3, line 32 to page 4, line 4. The examiner finds (Answer, page 4), and the appellants do not dispute (Brief, Reply Brief and

Supplemental Reply Brief in their entirety), that the catalyst described in Hattori contains a lanthanum series rare earth metal compound (neodymium compound) corresponding to the claimed component (a), an organoaluminum compound corresponding to the claimed component (d), and a halide compound. The examiner finds (Answer, page 4), and the appellants do not dispute (Brief, Reply Brief and Supplemental Reply Brief in their entirety), that Hattori teaches that its process produces polymers with high cis-1, 4 conjugated diene contents of more than 90%. Indeed, Hattori exemplifies processes by which polymers having cis-1,4 conjugated diene contents ranging from 96.8% to 97.3% are produced. See pages 12, Table 1, page 17, Table 2 and page 19, Table 3. Implicit in Hattori's teachings is that these high cis-1,4 conjugated diene contents and modifying agent are important in improving wear resistance and mechanical characteristics. See, e.g., Hattori, page 3, lines 1-8, page 7, line 58 to page 8, line 3.

The examiner recognizes that the catalyst described in Hattori does not contain the claimed methylaluminoxane and the claimed halogenated silicon compound. To remedy these deficiencies, the examiner relies on the disclosures of Tsujimoto and Ansell. The examiner finds (Answer, pages 4 and 6) and the appellants do not

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dispute (Brief, Reply Brief and Supplemental Reply Brief in their entirety), that

[I]t is known in the art to add an aluminoxane to a catalyst system comprising a) a lanthanum series rare earth metal compound, b) an organoaluminum and c) a halide compound for polymerizing conjugated dienes, for the purpose of obtaining even **narrower molecular weight distributions and higher cis-1,4-bond contents**, such as taught by Tsujimoto et al. (See ¶ 25 in Full translation of Tsujimoto et al.)

. . . .

[I]t is known in the art to use a halogenated silicon compound as a halide component in a catalyst system for polymerizing conjugated dienes, for the purpose of obtaining products of narrower molecular weight distribution and/or smaller high molecular weight fractions whilst retaining desired very high cis-1,4 bond content and catalyst activity, such as taught by Ansell et al. See page 3, lines 11-15.

The examiner then concludes that one of ordinary skill in the art would have been led to include the aluminoxane described in Tsujimoto and the halogenated silicon compound described in Ansell (as Hattori's halide component) in the polymerization catalyst described in Hattori, motivated by a reasonable expectation of successfully obtaining the advantages taught by Tsujimoto and Ansell.

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The appellants do not dispute the examiner's determination that it would have been *prima facie* obvious to employ the halogenated silicon compound described in Ansell as the halide component of the polymerization catalyst described in Hattori. Compare the Answer, pages 4 and 5, with the Brief, Reply Brief, Supplemental Reply Brief, and Appellants' Response to Examiner's "Office Communication" Dated September 4, 2003 in their entirety. Rather, the appellants appear to argue that one of ordinary skill in the art would not have been led to include the aluminoxane described in Tsujimoto in the polymerization catalyst of Hattori. See the Brief, pages 11 and 12. We do not agree.

The applied prior art references, like the appellants, recognize the importance of obtaining polymers having not only high cis-1,4 conjugated diene polymer contents, but also narrow molecular weight distributions (Mw/Mn). The narrow molecular weight distributions (Mw/Mn) and desired molecular weights, for example, are known to be important "since they affect the processing characteristics of the diene polymer, such as the processability and carbon black incorporation time, the physical properties of the cured polymer ...". See, e.g., Ansell, page 1, line 27 to page 2, line 15. According to Tsujimoto, its improved polymerization catalyst is useful for obtaining conjugate diene

polymers having a high cis-1, 4 structure and a narrow molecular weight distribution from a conjugate diolefin or conjugate diolefin mixture. See pages 1 and 10. We find that Tsujimoto then shows in its examples that the addition of methylaluminoxane to the polymerization catalyst of the type described in Hattori, i.e., a catalyst containing a lanthanum series rare earth metal compound (neodymium compound), an organoaluminum compound, and a halide compound, assists in obtaining conjugate diene polymers having narrower molecular weight distributions ( $M_w/M_n$ ) than those produced by the polymerization catalyst of the type described in Hattori (without methyl aluminoxane as part of the catalyst). See, e.g., pages 20 and 22, Tables 1, 2 and 6, together with pages 14 and 15. Specifically, we find that Tsujimoto teaches that the presence of methylaluminoxane in the polymerization catalyst of the type described in Hattori is useful for producing conjugate diene polymers having narrow molecular weight distributions ( $M_w/M_n$ ) ranging from 2.3 to 3.2 at the polymerization temperature taught by Hattori. Compare Hattori, page 6, lines 7-8 relating to its polymerization temperature with Tsujimoto, pages 13 and 15, relating to its polymerization temperature and pages 20 and 22, Tables 1, 2 and 6, relating to the actual molecular weight distributions. Thus, we concur with the examiner that one of

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ordinary skill in the art would have been led to include methylaluminumoxane in the polymerization catalyst of Hattori, motivated by a reasonable expectation of successfully improving the polymer produced by Hattori's process.

As a rebuttal to the *prima facie* case of obviousness established by the examiner, the appellants argue that the showing in the specification and Rule 132 declarations<sup>4</sup> executed by Takuo Sone (one of the inventors in the present application) on June 14, 2000 and August 15, 2000, respectively, demonstrates that the elected subject matter of the appealed claims imparts unexpected results. See the Brief, pages 13-23, the Reply Brief, pages 3-5 and Appellants' Response to Examiner's "Office Communication" Dated September 4, 2003, pages 4-6. However, a close examination of the showing in the specification and Rule 132 declarations reveals that the appellants have not carried their burden of showing unexpected results.

Initially, we find that none of the Runs, experiments or examples in the specification and the Rule 132 declarations, except

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<sup>4</sup> While the first Rule 132 declaration was executed by Takuo Sone (one of the inventors in the present application) on June 14, 2000, the second Rule 132 declaration, otherwise known as the "supplemental declaration" was executed by Takuo Sone on August 15, 2000.

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for Example 24 in the specification and Run No. 9 in the second Rule 132 declaration (referred to by the appellants as the "supplemental declaration"), employs catalytic components and a modifying agent, which are within the elected subject matter of the appealed claims. We find that Example 6 in the specification and Run No. 13 in the second Rule 132 declaration, for example, do not employ catalysts within the elected subject matter of the appealed claims. See the specification, pages 37, 39, 40 and 48 and the second Rule 132 declaration, page 4. The catalysts employed therein are simply devoid of the claimed and elected halogenated silicon compound. *Id.* Similarly, we find that Runs 1 and 5 shown in the first Rule 132 declaration employ neither a catalyst nor a modifying agent within the elected subject matter of the appealed claims.

We find that the appellants have not demonstrated that the conjugated diene polymers produced in Example 24 and Run 9 have unexpected properties. See *In re Merck & Co.*, 800 F.2d 1091, 1099, 231 USPQ 375, 381 (Fed. Cir. 1986); *In re Freeman*, 474 F.2d 1318, 1324, 177 USPQ 139, 143 (CCPA 1973). We find that Example 24 and Run 9 show the production of conjugated diene polymer having a cis-1, 4-bond content of 96.8% and a molecular weight distribution (Mw/Mn) of 2.6. This polymer has a rebound resilience of 67% and a

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wear resistance index of 127. However, as indicated *supra*, the presence of methylaluminoxane in the polymerization catalyst of the type described Hattori is reasonably expected to produce conjugated diene polymer having a cis-1, 4-bond content of 96.8% to 97.3% and a molecular weight distribution of 2.3 to 3.2, which according to the applied prior art references, improve, *inter alia*, wear resistance and other physical characteristics. Moreover, as found by the examiner at page 10 of the Answer and as indicated *supra*, Hattori teaches that wear resistance and other mechanical properties of the conjugated diene polymer can be further improved by modifying it with a particular modifying agent. Thus, we concur with the examiner that the properties referred to in the specification and the Rule 132 declarations are reasonably expected by one of ordinary skill in the art from the teachings of the applied prior art references. See, e.g., *In re Skoner*, 517 F.2d 947, 950, 186 USPQ 80, 82 (CCPA 1975) ("Expected beneficial results are evidence of obviousness of a claimed invention just as unexpected beneficial results are evidence of unobviousness"). The appellants have not proffered "any evidence to suggest that the effects of the aluminoxane taught by Tsujimoto ... and the modifying agent taught by Hattori ... are not simply accumulative



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with regard to [the claimed] properties such as wear resistance."  
See the Answer, page 10.

To the extent that Example 24 and Run 9 evince that the appellants have discovered new additional benefits, it is our judgement that on balance, the expected advantages of employing the polymerization catalyst and modifying agent as suggested by the applied prior art references outweigh the appellants' newly discovered benefits for the reasons well articulated by the examiner at pages 9-11 of the Answer. See *In re May*, 574 F.2d 1082, 1092, 197 USPQ 601, 609 (CCPA 1978); *In re Nolan*, 553 F.2d 1261, 1267, 193 USPQ 641, 645 (CCPA 1977).

Also, we find that the appellants have not demonstrated that the showing in Example 24 and Run 9 is reasonably commensurate in scope with the elected subject matter of the appealed claims. See *In re Clemens*, 622 F.2d 1029, 1035, 206 USPQ 289, 296 (CCPA 1980). While Example 24 and Run 9 are directed to polymerizing a specific diene with a specifically prepared and aged polymerization catalyst containing, e.g., particular amounts of specific neodymium and halogenated silicon compounds, under a particular polymerization reaction condition and modifying the resulting polymer with a specific epoxide containing compound (styrene oxide), the elected subject matter of the appealed claims is not so limited. Compare

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the elected subject matter of the appealed claims with the specification, pages 53 and 54 and the second Rule 132 declaration, pages 1-3. The elected subject matter of the appealed claims embraces polymerization catalysts, polymerization conditions and epoxide containing compounds (modifying agents), which are materially different from those employed in Example 24 and Run 9.

Moreover, we find that the appellants have not compared the elected subject matter of the appealed claims with the closest embodiment of the closest prior art, i.e., Hattori. *In re Baxter Travenol Labs*, 952 F.2d 388, 392, 21 USPQ2d 1281, 1285 (Fed. Cir. 1991). While Runs 10 and 14 employ a catalyst and a modifying agent within those disclosed in Hattori, they are not directed to a polymerization process for producing conjugated diene polymer having a cis-1, 4 bond content of, e.g., 97.3%, which is the closest to those polymers produced in Example 24 and Run 9.

Finally, we cannot ascertain from the showing in the specification and Rule 132 declarations whether the allegedly improved properties are due to the presence of different amounts of organoaluminum compound, and/or methylaluminoxane as alleged. *In re Dunn*, 349 F.2d 433, 439, 146 USPQ 479, 483 (CCPA 1965) ("While we do not intend to slight the alleged improvements, we do not feel it an unreasonable burden on appellants to require comparative

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examples relied on for non-obviousness to be truly comparative. The cause and effect sought to be proven is lost here in the welter of unfixed variables." ). In this regard, we note that Example 24 and Run 9 employ a different amount of a specific organoaluminum compound in their catalysts than those employed in Runs 10 and 14.

Thus, after due consideration of all of the evidence and arguments proffered by both the examiner and the appellants, we determine that the preponderance of evidence weighs in favor of obviousness. Accordingly, we affirm the examiner's decision rejecting all of the appealed claims under 35 U.S.C. § 103 as unpatentable over the combined teachings of Hattori, Tsujimoto and Ansell.

However, we reverse the examiner's rejection of claims 1 through 4, 9 through 14 and 19 under 35 U.S.C. § 103 as unpatentable over the combined teachings of Hattori and Tsujimoto since the examiner acknowledges that the catalyst suggested by Hattori and Tsujimoto lacks a halogenated silicon compound (elected subject matter). See the Answer, page 6.

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CONCLUSION

In summary:

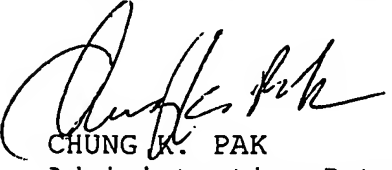
- 1) The rejection of claims 1 through 4, 8 through 14 and 19 under 35 U.S.C. § 103 as unpatentable over the combined teachings of Hattori, Tsujimoto and Ansell is affirmed;
- (2) The rejection of claims 1 through 4, 9 through 14 and 19 under 35 U.S.C. § 103 as unpatentable over the combined teachings of Hattori and Tsujimoto is reversed.


Accordingly, the decision of the examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

  
EDWARD C. KIMLIN  
Administrative Patent Judge

  
CHUNG K. PAK  
Administrative Patent Judge

  
JAMES T. MOORE  
Administrative Patent Judge

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